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A DISCRIMINATION TASK FOR RESTRAINED BEAGLES

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Research was conducted according to the principles enunciated in the "Guide for Laboratory Animal Facilities and Care," prepared by the National Academy of Sciences - National Research Council.

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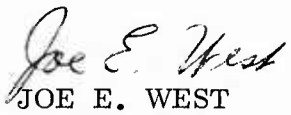

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ABSTRACT

A procedure in which beagles were trained by shock avoidance conditioning to perform a discrimination task cued by visual and auditory stimuli is described. The time required to train most dogs averaged 50 days. When trained, dogs performed at better than 95 percent correct response. The techniques can be carefully controlled to produce standardized trained animals for applied behavioral research.

I. INTRODUCTION

Behavioral research in dogs is a relatively recent development. Most studies concerned with more complex behavior than simple Pavlovian conditioning have been done since 1949.[6] To test the effect of independent variables (breed differences, isolation, etc.) on performance, beagles have been trained to discrimination tasks of varying complexities.[1-5] These studies showed that the beagle is an able learner despite its hyperexcitability and marked tendency for distraction by human observers.

This report describes a procedure used to successfully train beagles by shock avoidance conditioning to work a discrimination problem cued by visual and auditory stimuli.

II. MATERIALS AND METHODS

The experimental animals were four male and six female AKC registrable beagles, 1-1/2 to 3 years old and weighing 8 to 12 kg at the beginning of training.

The dogs were trained to briefly flex the appropriate forelimb on cue. The animals were placed in the testing box where only the head was firmly restrained by an adjustable yoke (Figure 1). The front paws were strapped to metallic grid keys which, when manipulated, actuated electrical circuits that served to record forelimb flexing. The keys also functioned as the electrodes for the shock avoidance conditioning.

A high (1125 Hz) and a low (450 Hz) frequency tone from a 2-inch diameter speaker directly above the dog's head provided the auditory cues. A 12-volt incandescent light in front of each key provided the visual cue. The dogs were trained to flex the right forelimb in response to the high frequency tone and light in front of the right

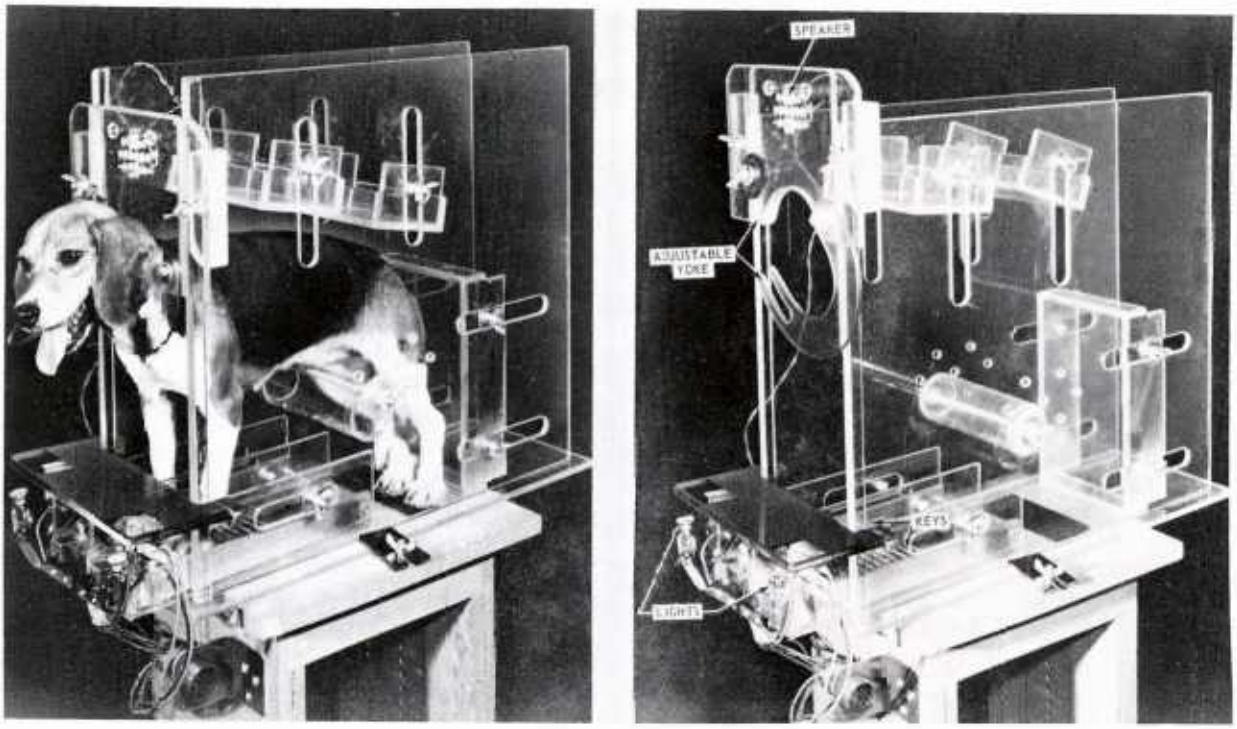

Figure 1. Beagle testing box

key and to flex the left forelimb in response to the low frequency tone and light in front of the left key.

The cues were started at the beginning of each 10-second trial. If the dog responded correctly by flexing the appropriate forelimb within 6 seconds, it avoided electrical shock and the cues were terminated. The remainder of the trial served as a rest period. When the dog responded incorrectly by flexing the wrong forelimb, the cues were terminated and a 60-cycle electrical current was applied for 1/2 second through the grid key to the paw of the forelimb that should have been flexed. The shock level, which could be varied between 0 and 10 mA with a maximum of 170 V, was adjusted for each animal. For most animals, the current required for appropriate response did not exceed 2 mA, a level not visibly uncomfortable to the animals. If after

6 seconds, the dog did not respond (scored as an omission) the cues were turned off and the electrical shock was delivered.

Dogs were conditioned to the training box for 1 hour per day (Figure 1). After 3 to 5 days, the animals were adequately conditioned and training for about 1 hour per day, 5 days per week began.

The first phase of training consisted of manually shaping the dog's responses so that it would flex the proper forelimb when the conditioning stimuli (lights and tones) were given and before shock was presented. The number and intensity of shocks were carefully adjusted for each animal. When this phase of training ended, the stimuli were being presented such that the dog was required to raise only the left or right forelimb for at least 100 consecutive trials before switching to the opposite limb. This phase was complete when the animal attained at least 90 percent correct response for a minimum of 100 trials for each forelimb.

The second phase of training dealt with the gradual randomization of stimulus presentation. This was achieved by gradually decreasing the consecutive number of trials for a given forelimb. The trials were reduced from 100 consecutive trials down to 20 then 10, 5, and finally complete randomization. A criterion of 90 percent correct response for a minimum of 100 trials was necessary before going to the next lower increment.

The third phase of training was a practice or stabilization period consisting of 1 to 2 hours of training per day during which the dog received 100 to 200 trials. Each animal was considered fully trained when it achieved a minimum steady-state performance level of 90 percent correct response.

III. RESULTS AND DISCUSSION

The number of trials and number of training days to reach performance criterion for phases 1 and 2 of training are shown in Table I for each animal. Note that there is no strict correlation in the time or number of trials required to achieve criterion between phases 1 and 2. On the average, about 15 days and about 4000 to 4500 trials were required for training through these two stages.

Table I. Number of Training Days and Trials Required to Achieve 90 percent Correct Response in Training Phases 1 and 2

Dog #	Phase 1		Phase 2	
	Number of days	Number of trials	Number of days	Number of trials
1	4	700	8	2600
2	4	700	8	3900
3	4	1000	11	3900
4	5	1200	6	1400
5	5	800	17	5200
6	6	800	8	2900
7	6	600	16	3400
8	8	1400	5	1000
9	9	1400	10	2300
10	9	2200	20	5500
Average	6.0	1080	10.9	3210

Figure 2 shows the gradual improvement in performance which occurs during training phase 3. This improvement is evident by performance stabilizing near the 100 percent level of correct response. A marked reduction in errors also occurs as indicated by the progressively smaller standard deviation about each mean value. Upon completion of this training phase, all animals performed above 97 percent correct response.

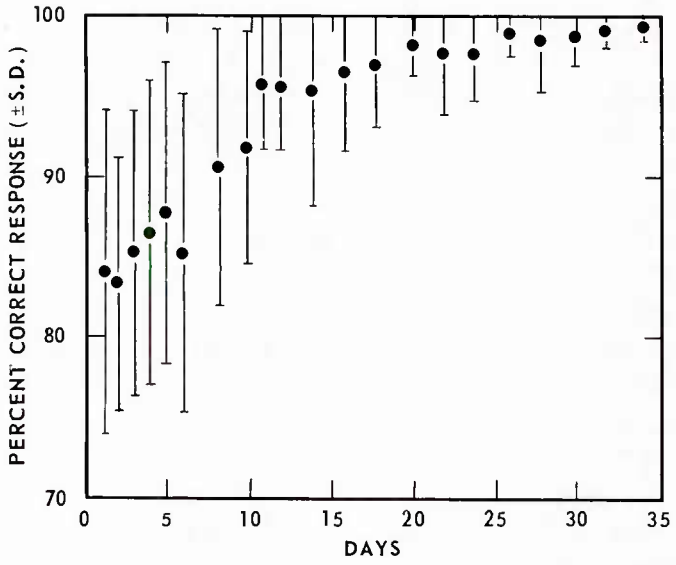

Figure 2. Performance during the third phase of training: stabilization and error reduction

Results of this study showed that beagle dogs attained a highly accurate and stable performance level after 40 to 60 days of training with the procedures described. Since these results are based on training sessions of about 1 hour per day involving 100 to 200 trials, some reduction in training time may be possible by increasing the time and number of trials given during each session.

Each phase of training can be carefully controlled using standardized procedures to produce dogs capable of consistent and highly accurate levels of performance, a necessity when comparing effects of independent variables on different groups of animals. Dogs trained according to the procedures described in this report have been entirely suited to evaluate toxicological effects of drugs and radiation on behavior.

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13. ABSTRACT

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